

# PATENT ABSTRACTS OF JAPAN

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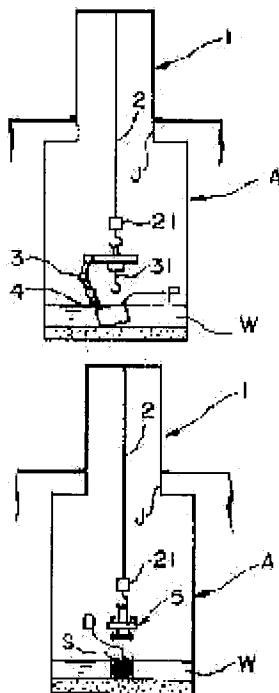
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## **(54) RECOVERY METHOD FOR STORED SOLID WASTE AND ITS DEVICE**



### **(57)Abstract:**

**PROBLEM TO BE SOLVED:** To minimize the addition of new equipment and surely recover solid waste by opening solid waste container in pool water with an opening means and moving the exposed solid waste to a shield vessel and sealing it.

**SOLUTION:** A manipulator 3 and an opening means 4 are fixed to a lifting means 2 for a cask 1, which is hung down in a pool W. By operating the manipulator 3, the opening means 4 is made to have access to solid waste container P and a lid or the vicinity of the lid is cut to expose in water the solid waste D contained in the solid waste container P. Next, by using the hoist 31 of the manipulator 3, another shield vessel S is hung down. Then, with the operation of the manipulator 3, the solid waste D is made upward posture and grasped with the manipulator 3 to charge in the shield vessel S. In place of the

manipulator 3, a lid tightening means 5 is hung down, a lid is put on the shield vessel S to be in a sealed state, which is lifted up simultaneously with the lid tightening means 5 and contained in the hollow part in the cask 1. This cask 1 is run and carried out.

## TECHNICAL FIELD

[Field of the Invention] This invention relates to the recovery approach of storage solid waste, and its facility.

## CLAIMS

### [Claim(s)]

[Claim 1] The solid waste currently stored in the pool (W) of a wet storage shed (A) is collected. The process which it is [ process ] the approach of containing in an electric shielding container (S) at a seal condition, and drops an opening means (4) to pool underwater from the end connection above a pool (J), The process which makes an exposure the solid waste (D) with which opens a solid waste receipt can (P) and the interior is loaded, The recovery approach of the storage solid waste characterized by having the process which takes down a new electric shielding container (S) to pool underwater, and moves solid waste into it, and the process which puts a lid on an electric shielding container, is pulled up and are collected from pool underwater as a seal condition.

[Claim 2] The recovery approach of the storage solid waste according to claim 1 characterized by transporting the electric shielding container (S) in the condition of having sealed a solid waste receipt can (P) and solid waste (D) in the condition of having isolated by the cask (1).

[Claim 3] The recovery approach of the storage solid waste according to claim 1 or 2 characterized by setting up opening of an electric shielding container (S) as an upper part location rather than the liquid level of pool water.

[Claim 4] It is stored into the pool (W) of a wet storage shed (A), and \*\*\*\*\* solid waste is collected. The cask which is the facility contained in the seal condition and is allotted to an electric shielding container (S) possible [ transit ] in the upper part of the end connection above a pool (J) (1), The lifting means allotted to the interior of this cask (2), A recovery facility of the storage solid waste characterized by providing the opening means (4) which makes an exposure the solid waste (D) with which hangs inside a pool with this lifting means, is taken down, opens a solid waste receipt can (P), and the interior is loaded.

[Claim 5] A recovery facility of the storage solid waste according to claim 4 characterized by arranging the manipulator (3) which moves solid waste (D) into the new electric shielding container (S) supplied to the lifting means (2).

[Claim 6] A recovery facility of the storage solid waste according to claim 4 or 5 characterized by allotting a lid bundle means (5) to load an electric shielding container (S) with solid waste (D), and to put and seal a lid for a lifting means (2).

[Claim 7] A recovery facility of the storage solid waste according to claim 4, 5, or 6 characterized by being arranged in the interior of a cask (1) it lifts with an opening means (4) and a means (2) holds solid waste (D) in an isolation condition.

## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the recovery approach of storage solid waste, and its facility.

[0002]

[Description of the Prior Art] The solid waste generated in the nuclear-power-plant related facility is isolated and stored according to radiation level. If it is in miscellaneous solid waste, spent fuel rod covering tubing, etc., while performing Shache, the shear by cutter cutting, sorting of a useful metal, the receipt to a stowage container (for example, Hull can), etc., changing into the condition of a solid waste receipt can if needed, dipping in the pool underwater of the storage shed isolated from the living environment and reducing leakage of a radiation, he is trying to remove the decay heat of the radioactive substance.

[0003]

[Problem(s) to be Solved by the Invention] However, when it is necessary to collect the solid waste receipt cans held in pool underwater, and to move to other facilities, the activity which pulls up a solid waste receipt can from pool underwater is needed, but when the seal function of a solid waste receipt can is spoiled by the pool underwater storage which attains to a long period of time, it is needed in the treatment prevent the exposure and radioactive contamination at the time of raising and conveyance.

[0004] Moreover, based on remote operation, technical difficulty is accompanied by the internal ambient atmosphere of the storage shed of solid waste while it is required that recovery of storage solid waste should be performed by remote operation and it becomes what has a large-scale recovery facility, since it is in the controlled area of a radiation.

[0005] This invention tends to attain the following purposes while solving such a technical problem effectively.

\*\* Lessen addition of a new facility on the occasion of recovery of solid waste.

\*\* When the seal function of a solid waste receipt can is spoiled, or when solid waste is sticking out, even if you are, collect solid waste certainly.

\*\* Seal the collected solid waste and raise the safety at the time of conveyance.

\*\* Reduce the effect by the condition of a solid waste receipt can, and raise the versatility at the time of recovery.

[0006]

[Means for Solving the Problem] It is the technique which collects the solid waste in the condition of having been stored by the pool underwater of a storage shed, and is contained in a new electric shielding container at a seal condition. While making into the exposure the solid waste with which an opening means is dropped to pool underwater from the end connection above a pool, opens a solid waste receipt can, and the interior is loaded A new electric shielding container is taken down to pool underwater, solid waste is moved into it, a lid is put on a new electric shielding container, and the technique which is pulled up and are collected from pool underwater as a seal condition is adopted. While allotting the cask for transporting solid waste in the state of isolation to the upper part location of the end connection of the pool in a storage shed, the lifting means is allotted to this cask and it is made to go up and down an opening means, a manipulator, a lid bundle means, solid waste, etc. By remote operation through a manipulator, an opening means is set as the location of a solid waste receipt can. After loading an electric

shielding container with solid waste in an underwater ambient atmosphere, with a lid bundle means, a lid is put on an electric shielding container and sealed.

[0007]

[Embodiment of the Invention] Hereafter, the recovery approach of the storage solid waste concerning this invention and 1 operation gestalt of the facility are explained with reference to drawing 1 thru/or drawing 7. each [ these ] drawing -- setting -- Sign A -- a wet storage shed (storage shed) and B -- a dry type storage shed (storage shed) and H -- a conveyance room and T -- a workroom and C -- an overhead traveling crane and J -- an end connection and W -- a pool and P -- in a solid waste receipt can and 1, a manipulator and 4 show an opening means and, as for a cask and 2, 5 shows the lid bundle means, as for a lifting means and 3.

[0008] In a recovery facility of the storage solid waste in 1 operation gestalt, two wet storage sheds A, one dry type storage shed B, and workroom T are made into the condition of having connected by the conveyance room H, and a cask 1 is allotted to the conveyance room H possible [ transit ] by Orbit R.

[0009] When said solid waste receipt can P contains miscellaneous solid waste, spent fuel rod covering tubing, etc. which were mentioned above to a stowage container (for example, Hull can), sealing performance is spoiled and there is the concern, or when soundness is held, a cask 1, the lifting means 2, a manipulator 3, the opening means 4, and the lid bundle means 5 are used, and moving of the solid waste D to the new electric shielding container S is made.

[0010] As shown in drawing 7, it allots a manipulator 3, the opening means 4, and the lid bundle means 5 to the lifting means 2 arranged in this centrum 12 according to the activity purpose, takes these down from the lower opening 13 caudad to it, and is made said cask 1 having the centrum 12 surrounded by the radiation shielding wall 11, and it working for it about a request, while it has the function which runs the inside of the conveyance room H in accordance with Orbit R.

[0011] Said lifting means 2 has low TEDA 21 for permitting level rotation of a manipulator 3, the opening means 4, and lid bundle means 5 grade while what has functions, such as a loop wheel machine, is adopted and it is allotted to the centrum 12 of a cask 1.

[0012] For example, a small beam manipulator is applied, said manipulator 3 is attached in the lifting means 2 at a lifting-and-holding condition, and the small hoist 31 is arranged on the lower part.

[0013] An underwater plasma cutting machine is adopted, for example, and when [ for which it has the function which can be opened by cutting the lid of the solid waste receipt can P, or its neighborhood underwater etc. ] it is a plasma cutting machine, the part of a torch is supported by the manipulator 3, and said opening means 4 is moved to a desired cutting location, and performs cutting which mainly opens the solid waste receipt can P in underwater.

[0014] While having the function which replaces said lid bundle means 5 with a manipulator 3 or the opening means 4, is attached in the lifting means 2 at a lifting-and-holding condition, puts a top cover to the electric shielding container S, and can be made into a seal condition with a bolt etc. What has the function which lifts the electric shielding container S in the condition of having held the harness of a top cover etc. and having put the top cover, to the conveyance room H as it is, and the function to release

the part which is holding the top cover after lifting, and the electric shielding container S is adopted.

[0015] Hereafter, supplementary information is carried out about recovery of storage solid waste.

[0016] [Opening of a solid waste receipt can] as shown in drawing 1, for the lifting means 2 allotted to the centrum 12 of a cask 1 A manipulator 3 and the opening means 4 are attached, and it hangs and takes down to the pool W of the wet storage shed A. By actuation of a manipulator 3 The opening means 4 is made to approach the solid waste receipt can P, the lid of the solid waste receipt can P or its near is cut in underwater, and the solid waste D contained by the solid waste receipt can P is exposed underwater.

[0017] [Carrying in of an electric shielding container] As shown in drawing 2, the new electric shielding container (stowage containers, such as a standard drum) S is hung and taken down to the interior of Pool W by using together the hoist 31 of the lower part of a manipulator 3. under the present circumstances -- alike -- up opening of the electric shielding container S -- a pool -- it is desirable to carry out as [ become / from water level / an upper part location ] (for pool water not to enter -- as).

[0018] [solid waste -- repacking -- ] -- as shown in drawing 3, while making the solid waste D of an open condition into a upward condition by actuation of a manipulator 3, the solid waste D held is held with a manipulator 3, and it repacks in the electric shielding container S.

[0019] [Seal of an electric shielding container] As shown in drawing 4, replace with a manipulator 3, and the lid bundle means 5 is hung and taken down. After making solid waste D into a seal condition by putting a lid (top cover) on the electric shielding container S, and performing bolting etc., while lifting the electric shielding container S to the lid bundle means 5 and coincidence and holding in the centrum 12 of a cask 1 By making it run a cask 1, it collects taking out to Workroom T via the conveyance room H etc.

[0020] [The repeat of an activity and withdrawal] After holding and sealing the cutting waste generated at the time of an opening activity in the electric shielding container S, the opening activity thru/or taking-out activity shown in drawing 1 thru/or drawing 4 is taken out, while being repeated until the solid waste receipt can P is lost in the wet storage shed A. Moreover, a manipulator 3, the opening means 4, and lid bundle means 5 grade are also removed.

[0021]

[Effect of the Invention] According to the recovery approach of the storage solid waste concerning this invention, and its facility, the following effectiveness is done so.

(1) Since an opening means and a lid bundle means are carried in in a pool, it opens, and a solid waste receipt can repacks using a cask and a lifting means and it is made to perform seal to a new electric shielding container, on the occasion of recovery of solid waste, addition of a new facility can be controlled to the minimum.

(2) Even if it is when the seal function of a solid waste receipt can is spoiled, or when solid waste is exposed since a solid waste receipt can is opened and it repacks in a new electric shielding container, solid waste can be certainly returned to a seal condition, and can be collected.

(3) Since a series of activities from opening to conveyance are done in the condition of having isolated by the cask while making the repacked solid waste into a seal condition,

the safety of an activity can be raised.

(4) Without these being influenced even if it is, when there are a case where the seal function of the solid waste receipt can stored in the pool is spoiled, and its concern, solid waste can be returned to a seal condition, and can be collected, and these can raise the versatility at the time of recovery.

## PRIOR ART

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[Description of the Prior Art] The solid waste generated in the nuclear-power-plant related facility is isolated and stored according to radiation level. If it is in miscellaneous solid waste, spent fuel rod covering tubing, etc., while performing Shache, the shear by cutter cutting, sorting of a useful metal, the receipt to a stowage container (for example, Hull can), etc., changing into the condition of a solid waste receipt can if needed, dipping in the pool underwater of the storage shed isolated from the living environment and reducing leakage of a radiation, he is trying to remove the decay heat of the radioactive substance.

## EFFECT OF THE INVENTION

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[Effect of the Invention] According to the recovery approach of the storage solid waste concerning this invention, and its facility, the following effectiveness is done so.

(1) Since an opening means and a lid bundle means are carried in in a pool, it opens, and a solid waste receipt can repacks using a cask and a lifting means and it is made to perform seal to a new electric shielding container, on the occasion of recovery of solid waste, addition of a new facility can be controlled to the minimum.

(2) Even if it is when the seal function of a solid waste receipt can is spoiled, or when solid waste is exposed since a solid waste receipt can is opened and it repacks in a new electric shielding container, solid waste can be certainly returned to a seal condition, and can be collected.

(3) Since a series of activities from opening to conveyance are done in the condition of having isolated by the cask while making the repacked solid waste into a seal condition, the safety of an activity can be raised.

(4) Without these being influenced even if it is, when there are a case where the seal function of the solid waste receipt can stored in the pool is spoiled, and its concern, solid waste can be returned to a seal condition, and can be collected, and these can raise the versatility at the time of recovery.

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, when it is necessary to collect the solid waste receipt cans held in pool underwater, and to move to other facilities, the activity which pulls up a solid waste receipt can from pool underwater is needed, but when the seal function of a solid waste receipt can is spoiled by the pool underwater storage which attains to a long period of time, it is needed in the treatment prevent the exposure and radioactive contamination at the time of raising and conveyance.

[0004] Moreover, based on remote operation, technical difficulty is accompanied by the

internal ambient atmosphere of the storage shed of solid waste while it is required that recovery of storage solid waste should be performed by remote operation and it becomes what has a large-scale recovery facility, since it is in the controlled area of a radiation.

[0005] This invention tends to attain the following purposes while solving such a technical problem effectively.

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## MEANS

[Means for Solving the Problem] It is the technique which collects the solid waste in the condition of having been stored by the pool underwater of a storage shed, and is contained in a new electric shielding container at a seal condition. While making into the exposure the solid waste with which an opening means is dropped to pool underwater from the end connection above a pool, opens a solid waste receipt can, and the interior is loaded. A new electric shielding container is taken down to pool underwater, solid waste is moved into it, a lid is put on a new electric shielding container, and the technique which is pulled up and are collected from pool underwater as a seal condition is adopted. While allotting the cask for transporting solid waste in the state of isolation to the upper part location of the end connection of the pool in a storage shed, the lifting means is allotted to this cask and it is made to go up and down an opening means, a manipulator, a lid bundle means, solid waste, etc. By remote operation through a manipulator, an opening means is set as the location of a solid waste receipt can. After loading an electric shielding container with solid waste in an underwater ambient atmosphere, with a lid bundle means, a lid is put on an electric shielding container and sealed.

[0007]

[Embodiment of the Invention] Hereafter, the recovery approach of the storage solid waste concerning this invention and 1 operation gestalt of the facility are explained with reference to drawing 1 thru/or drawing 7. each [ these ] drawing -- setting -- Sign A -- a wet storage shed (storage shed) and B -- a dry type storage shed (storage shed) and H -- a conveyance room and T -- a workroom and C -- an overhead traveling crane and J -- an end connection and W -- a pool and P -- in a solid waste receipt can and 1, a manipulator and 4 show an opening means and, as for a cask and 2, 5 shows the lid bundle means, as for a lifting means and 3.

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container S.

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[0020] [The repeat of an activity and withdrawal] After holding and sealing the cutting waste generated at the time of an opening activity in the electric shielding container S, the opening activity thru/or taking-out activity shown in drawing 1 thru/or drawing 4 is taken out, while being repeated until the solid waste receipt can P is lost in the wet storage shed A. Moreover, a manipulator 3, the opening means 4, and lid bundle means 5 grade are also removed.

## DESCRIPTION OF DRAWINGS

### [Brief Description of the Drawings]

[Drawing 1] It is the forward sectional view showing the opening situation in the recovery approach of the storage solid waste concerning this invention, and 1 operation gestalt of the facility.

[Drawing 2] It is the forward sectional view showing the recovery approach of the storage solid waste concerning this invention, and the installation situation of the electric shielding container in 1 operation gestalt of the facility.

[Drawing 3] It is the forward sectional view in which the solid waste in the recovery approach of the storage solid waste concerning this invention and 1 operation gestalt of the facility repacking, and showing a situation.

[Drawing 4] It is the forward sectional view showing the recovery approach of the storage solid waste concerning this invention, and the seal situation of the electric shielding container in 1 operation gestalt of the facility.

[Drawing 5] It is the plane section Fig. showing the recovery approach of the storage solid waste concerning this invention, and 1 operation gestalt of the facility.

[Drawing 6] It is the forward sectional view showing the recovery approach of the storage solid waste concerning this invention, and 1 operation gestalt of the facility.

[Drawing 7] It is the sectional side elevation of the part of the cask in the recovery approach of the storage solid waste concerning this invention, and 1 operation gestalt of the facility.

### [Description of Notations]

A Wet storage shed (storage shed)

B Dry type storage shed (storage shed)

C Overhead traveling crane

H Conveyance room

T Workroom

R Orbit

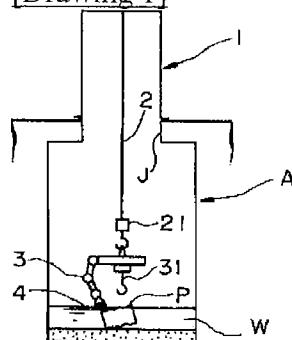
J End connection

W Pool

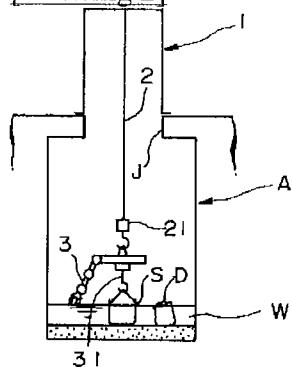
P Solid waste receipt can  
D Solid waste  
S Electric shielding container  
1 Cask  
2 Lifting Means  
3 Manipulator  
4 Opening Means  
5 Lid Bundle Means  
11 Radiation Shielding Wall  
12 Centrum  
13 Lower Opening  
21 Low TEDA  
31 Hoist

## DRAWINGS

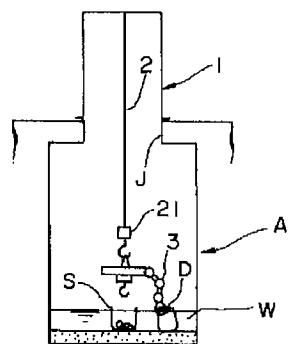
[Drawing 1]



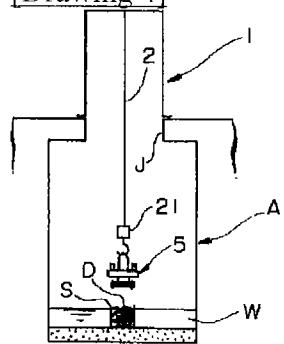
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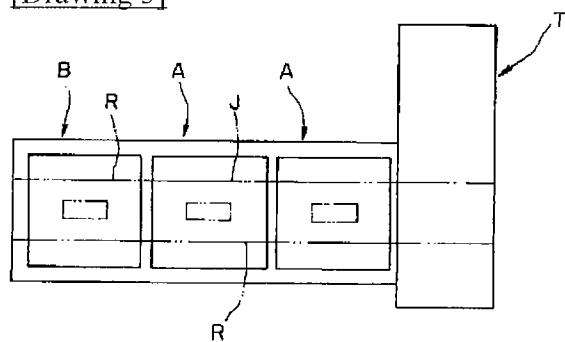
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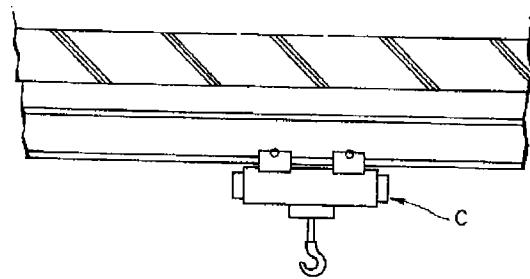
[Drawing 4]



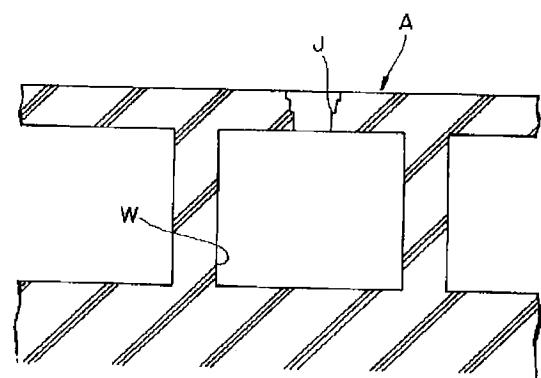
[Drawing 5]



[Drawing 6]



↔ H



[Drawing 7]

